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**Datasheet for the decision
of 4 November 2019**

Case Number: T 1044/16 - 3.3.03

Application Number: 04772002.4

Publication Number: 1657272

IPC: C08G64/30

Language of the proceedings: EN

Title of invention:

PROCESS FOR PRODUCING AROMATIC POLYCARBONATE

Patent Proprietor:

Mitsubishi Chemical Corporation

Opponent:

SABIC Global Technologies B.V.

Relevant legal provisions:

EPC Art. 123(2), 56

Keyword:

Amendments - allowable (yes)
Inventive step (yes) - solution not suggested by the state of
the art (ex post facto analysis)

Decisions cited:

T 0939/92



Beschwerdekammern
Boards of Appeal
Chambres de recours

Boards of Appeal of the
European Patent Office
Richard-Reitzner-Allee 8
85540 Haar
GERMANY
Tel. +49 (0)89 2399-0
Fax +49 (0)89 2399-4465

Case Number: T 1044/16 - 3.3.03

D E C I S I O N
of Technical Board of Appeal 3.3.03
of 4 November 2019

Appellant: SABIC Global Technologies B.V.
(Opponent) Plasticislaan 1
4612 PX Bergen op Zoom (NL)

Representative: Modiano, Micaela Nadia
Modiano Josif Pisanty & Staub Ltd
Thierschstrasse 11
80538 München (DE)

Respondent: Mitsubishi Chemical Corporation
(Patent Proprietor) 1-1, Marunouchi 1-chome
Chiyoda-ku
Tokyo 100-8251 (JP)

Representative: Vossius & Partner
Patentanwälte Rechtsanwälte mbB
Siebertstrasse 3
81675 München (DE)

Decision under appeal: **Interlocutory decision of the Opposition
Division of the European Patent Office posted on
17 March 2016 concerning maintenance of the
European Patent No. 1657272 in amended form.**

Composition of the Board:

Chairman D. Semino
Members: F. Rousseau
R. Romandini

Summary of Facts and Submissions

I. The appeal is against the interlocutory decision of the opposition division according to which European patent No. 1 657 272 as amended according to the documents of the main request (claims 1 to 41 submitted with letter of 30 December 2015) and a description adapted thereto met the requirements of the EPC.

II. Claim 1 of that request read as follows:

"1. A process for producing an aromatic polycarbonate which comprises:
a diphenyl carbonate production step in which phenol and at least one carbonyl compound are used as starting materials to produce diphenyl carbonate, said diphenyl carbonate production step being a step comprising a diphenyl carbonate reaction step and a diphenyl carbonate distillation step;
and optionally a bisphenol A production step in which phenol and acetone are used as starting materials to produce bisphenol A;
and an aromatic polycarbonate production step in which the diphenyl carbonate and the bisphenol A are used as starting materials to produce an aromatic polycarbonate via an aromatic carbonate polymerization step and by-product phenol is recovered,
characterized in that aromatic-carbonate vaporized ingredients resulting from the aromatic carbonate polymerization step are liquefied and subjected to a phenol distillation step to remove an aromatic-carbonate low-boiling distillate from the aromatic-carbonate vaporized ingredients and thereby recover the by-product phenol; the amount of water contained in the by-product phenol recovered in the aromatic

polycarbonate production step is regulated to 0.2% by weight or smaller;
this phenol is used as a starting material in the diphenyl carbonate production step and/or the bisphenol A production step; and a phenol distillation residue generated in the phenol distillation step is sent to the diphenyl carbonate distillation step."

Claims 2 to 41 were all dependent on claim 1.

III. The following documents submitted before the opposition division have been referred to in the appeal proceedings:

D2: LU 88 564

D5: US 5,747,609

D6: US 2002/0095020 A1

IV. According to the appealed decision the subject-matter of claim 1 of the main request was disclosed in dependent claim 17 of the application as filed which claim 17 should necessarily be read in the light of dependent claims 2 and 4. Accordingly, the subject-matter of claim 1 of the main request which resulted from the combined wording of claims 1, 2, 4 and 17 of the application as filed, was considered to meet the requirements of Article 123(2) EPC. A novelty objection originally raised by the opponent (hereafter appellant) with the notice of opposition was then withdrawn in the course of the first instance proceedings. An inventive step of the subject matter set out in claim 1 of the main request was acknowledged over each of D5 and D6, both representing a suitable starting point for assessing inventive step.

- V. An appeal against that decision was lodged by the opponent (hereafter appellant).
- VI. The patent proprietor (respondent) relied in its rejoinder on the main request and the first and second auxiliary requests filed before the opposition division with letter of 30 December 2015.
- VII. In response to the communication of the Board of 17 June 2019 sent in preparation for the oral proceedings the appellant withdrew its request for oral proceedings and requested a decision based on the state of the file.
- VIII. The respondent made further submissions with letter of 19 August 2019.
- IX. Subsequently, the parties were informed that the oral proceedings scheduled to take place on 27 September 2019 had been cancelled.
- X. As far as relevant to the present decision, the submissions of the appellant can be summarized as follows:

Amendments

- (a) Contrary to the opinion of the opposition division claim 1 of the main request formed by combining original claims 1, 2, 4 and 17 of the application as filed was not directly and unambiguously derivable from the application as filed, since a triple selection within the teaching of the application as filed was necessary in order to define the subject-matter of operative claim 1. Furthermore, having regard to paragraph [0135] of

the granted patent (sic), referring to Figure 1, as well as to the sole example described in [0295] of the granted patent (sic) in which the phenol distillation residue generated in the phenol distillation step was sent to a distillation step in the production of diphenyl carbonate, two distillation columns were required. Accordingly, claim 1 of the main request did not meet the requirements of Article 123(2) EPC.

Inventive step

D5 as closest prior art

- (b) Claim 1 of the main request differed from the prior art disclosed in D5 (Figure 1; column 25, lines 23-30) in that the phenol distillation residue was sent to a diphenyl carbonate distillation step, whereas in D5 it was reused as such by returning it to one of the polycarbonate reactors, meaning in that case that 100% of the diphenyl carbonate in the residue was recycled.
- (c) According to column 26, lines 45-47 of D5 this process resulted in a colorless polycarbonate. No evidence had been provided in the opposed patent that the claimed process offered any advantages. The opposition division correctly considered the claimed process as a mere alternative over D5.
- (d) D6 indicated in section [0011] that attempts to obtain highly pure diphenyl carbonate by overhead distillation had generally resulted in failure due to secondary reactions occurring at the high temperatures required for the distillation. Also in the patent in suit it was not possible to recover a

substantial part of the diphenyl carbonate. The claimed process required an extra distillation step to purify the residue of the phenol distillation, resulting in an inferior result. Even though the residue was purified in an existing distillation step this constituted an additional burden since it would increase the quantity of material to be purified in the existing distillation step. However, according to the Case Law an alternative process was considered obvious in case a disadvantage could be expected and such disadvantage actually occurred.

- (e) If for whatever non-disclosed reason it was deemed necessary to purify the residue, which mainly consisted of diphenyl carbonate, it was rather obvious to purify it in a diphenyl carbonate distillation step that was already present at the site. Therefore, the method of claim 1 did not involve an inventive step over D5.

D6 as closest prior art

- (f) The claimed process differed from the process of D6 only in the purification of the diphenyl carbonate containing residue of the phenol distillation step in the existing diphenyl carbonate distillation step used for the crude diphenyl carbonate instead of using the purification steps shown in Figure 1 of D6.
- (g) Based on the information provided in the patent in suit and in D6 it could not be concluded that the process of the patent in suit provided an improvement in terms of purity of the recovered diphenyl carbonate or an improvement of the rate of

recovery of the diphenyl carbonate. The claimed process represented therefore a mere alternative to the process disclosed in D6.

- (h) Once the phenol had been recovered, it was obvious for the skilled person to look for ways to recover the diphenyl carbonate rather than any other material, since it was known as shown in D2 that the vaporized ingredients of the carbonate polymerization step comprised mainly phenol, as well as a reasonable quantity of diphenyl carbonate and a minor quantity of other materials. The claimed process had a clear disadvantage with respect to D6 as could be expected in view of paragraph [0011] of that document. However, accepting an expected disadvantage could not render the claimed process inventive when such disadvantage actually occurred. Moreover it remained obvious to examine the possibility to purify a diphenyl carbonate containing residue in a diphenyl carbonate distillation step when such distillation step was available at the plant. Consequently, the method of claim 1 also lacked an inventive step over D5.

XI. As far as relevant to the present decision, the submissions of the respondent can be summarized as follows:

Amendments

- (a) As pointed out by the opposition division the combination of the features defined in claims 1, 2, 4 and 17 as originally filed was implied by the definition of claim 17 itself. The appellant's objection with reference to [0135] and [0295] of

the granted patent was also not well-founded as it amounted to an unjustified attempt to limit the scope of claim 1 to that of a working example. Accordingly, claim 1 did not extend beyond the content of the application as filed.

Inventive step

D5 as closest prior art

- (b) The reasoning of the opposition division was not correct in that the claimed method provided an improvement over D5. Although D5 mentioned that a colorless polycarbonate was obtained, this result concerned a process carried out for only 700 hours, which did not represent the time of an actual industrial continuous operation generally lasting for about one year. At this time, when the whole amount of the distillation residue was sent to a polymerisation reactor like in the process of D5, the coloured ingredients such as high-boiling ingredients by-produced in trace amounts during the reaction were not discharged from the system, but accumulated therein. As a result, in line with the remarks in paragraph [0021] of the patent in suit, it was believed that these ingredients affected the quality of the product. In contrast, in the method of operative claim 1 the impurity ingredients including coloured substances contained in the phenol distillation residue were separated by distillation in the production stream of diphenyl carbonate, whereby the quality of the product could be maintained stable for a longer period of time than in D5. Moreover, in comparison to D5 the claimed method did not lead to any deterioration of the produced polycarbonate.

- (c) As regard obviousness of the claimed solution, the person skilled in the art had no incentive to send the phenol distillation residue back to the educt level, since this feature was considered neither in D5, nor in D6, nor proposed by the common general knowledge of the person skilled in the art.
- (d) Moreover, in the process of D5 the bottom liquid of column 75 contained inevitably cresol and xylenol which in vessel 73 were in the gas phase and therefore did not participate in the polymerization reaction. However, sending the bottom liquid of column 75 to the distillation column used for the production of diphenyl carbonate would result in some xylenol and cresol to be inevitably sent to the first polymerizer vessels 71 and 71'. In these vessels those compounds would be present in the liquid phase due to different temperature and pressure conditions and as a result xylenol and cresol would participate to the polymerization reaction. This would lead to the formation of terminal methylphenyl and dimethylphenyl groups, which D5 explicitly taught to avoid as they adversely affected the melt stability of the aromatic polycarbonate at a high temperature. Therefore, D5 taught away from the claimed solution.
- (e) The subject-matter of claim 1 was therefore inventive over D5.

D6 as closest prior art

- (f) The method of operative claim 1 differed from that of D6 in the way of recovering and purifying the

diphenyl carbonate. Contrary to D6 wherein second and third distillation columns were added to recover the diphenyl carbonate, the process of the opposed patent was characterized in that the diphenyl carbonate was purified and recovered in the diphenyl carbonate distillation step used for the production of the diphenyl carbonate.

- (g) For the same reasons as mentioned in respect of D5, the claimed method constituted an improvement over the disclosure of D6. In Example 1 of D6 a recycle period of one week only was mentioned, but an actual production equipment was continuously operated for about a year. It was clear to the person skilled in the art that impurities accumulated during such a long period if by-products were recycled within the system. According to the impugned patent, diphenyl carbonate was purified outside the polycarbonate production and the disadvantages of the prior art were thus avoided.

- (h) The appellant's considerations of obviousness of the claimed solution appeared to be based on hindsight only. It had to be kept in mind that distillation conditions depended on the composition to be distilled. A composition originating from the diphenyl carbonate reaction step was expected to be different from a composition originating from the polymerization reaction, meaning that it was to be expected that different distillation conditions were required for both compositions. As a consequence the skilled person would not expect that the same conditions could be successfully used for a distillation carried out after the reaction step of producing diphenyl carbonate and a

distillation carried out after the polycarbonate synthesis.

- (i) There was no suggestion in D6 (or any other document cited by the appellant) to use the same distillation step for separating the products originating from the preparation of diphenyl carbonate and those contained in the phenol distillation residue. For the above reasons, the presence of an inventive step over D6 had also to be acknowledged.

XII. The appellant requested that the decision under appeal be set aside and the patent be revoked.

XIII. The respondent requested that the appeal be dismissed, or alternatively that the decision under appeal be set aside and the patent be maintained on the basis of the claims of the first auxiliary request or on the basis of the claims of the second auxiliary request, both sets of claims as filed with letter of 30 December 2015.

Reasons for the Decision

Main request

Article 123(2) EPC

1. In accordance with the established Case Law of the Boards of Appeal of the EPO, the relevant question to be decided in assessing whether the subject-matter of an amended claim extends beyond the content of the application as filed, is whether after the amendment the skilled person is presented with new technical information (see G 2/10, OJ 2012, 376, point 4.5.1 of

the Reasons and Case Law of the Boards of Appeal of the EPO, ninth edition 2019, II.E.1). As a consequence, the above mentioned amendment is only allowable if the skilled person would derive the resulting claimed subject-matter directly and unambiguously, using common general knowledge, from the application as filed.

- 1.1 The appellant argued that the wording of claim 1 of the main request which undisputedly is based on the combination of the wording of original claims 1, 2, 4 and 17 is not disclosed in the application as filed. According to the appellant the skilled reader would be required to operate a triple selection within the teaching of the application as filed by selecting each of dependent claims 2, 4 and 17 in order to arrive at the subject-matter of operative claim 1.
- 1.2 As indicated in point 2 of the reasons for the decision under appeal, claim 17 as filed defines a process which must comprise (i) a phenol distillation step from which a phenol distillation residue is obtained and (ii) a diphenyl carbonate distillation step to which said phenol distillation residue is sent.
- 1.3 Claim 17 as filed is dependent on any of claims 4 to 16. Among claims 4 to 16, only claims 4 to 7 and 10 refer to a phenol distillation step as defined in claim 17, claims 5 to 7 and 10 being all dependent on claim 4. Accordingly, the skilled person understands by the reference to a phenol distillation step in claim 17 that said step refers to a process comprising all measures defined in claim 4, as well as a diphenyl carbonate distillation step expressly defined in claim 17.

- 1.4 Among claims 4 to 16, only claims 6 and 11 refer to a diphenyl carbonate distillation step, claim 11 being dependent on claim 2 defining the use of a diphenyl carbonate distillation step. Claim 6 is dependent on claim 4, which claim is dependent on claims 1 to 3. Among those claims 1 to 3 only claim 2 defines a diphenyl carbonate distillation step. Accordingly, by reference to a diphenyl carbonate distillation step in claim 17, claim 17 is also meant to encompass all measures recited in claim 2.
- 1.5 The Board, therefore, concludes, in agreement with the finding of the opposition division, that claim 17 of the application as filed will be read by the skilled person as to encompass the features of claims 1, 2 and 4.
- 1.6 The Board notes that the replacement of the wording "and/or" in line 6 of claim 1 as filed by the term "optionally" has been not been objected. The Board has no reason to take a different view since this wording is a direct consequence of making mandatory, through the choice of claim 17, the use of a diphenyl carbonate production step as defined in claim 2.
- 1.7 The argument of the appellant that the application as filed would require the use of two distillation columns must be dismissed as it is based on passages concerning illustrative embodiments of the application as filed, while claim 1 is based on the claims as originally filed.
- 1.8 Accordingly, the objection by the appellant that claim 1 as amended extends beyond the content of the application as filed fails to convince.

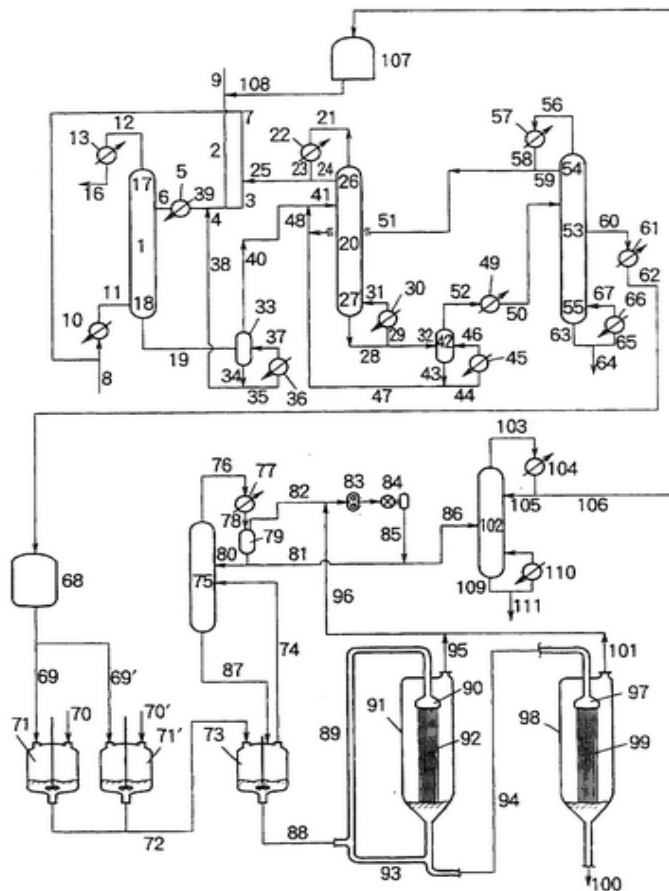
Inventive step

Closest prior art

2. The parties did not dispute the finding of the opposition division in the decision under appeal that the disclosures of D5 and D6 represent equivalent starting points for assessing inventive step. The Board has no reason to take a different view. Accordingly, inventive step should be analyzed starting from each of those documents as closest prior art.

Process shown in Figure 1 of D5 as the closest prior art

3. The method for producing an aromatic polycarbonate as disclosed in D5 is depicted in Figure 1 of that document reproduced below:



4. As shown in Figure 1 of D5, a second stage polymerisation takes place in vessel 73. It is described in column 25, lines 24-32, that an evaporated gas containing phenol by-produced during this polymerization stage is fed through conduit 74 to distillation column 75. The distillate leaving the top of distillation column 75 through conduit 76 mainly comprises phenol, whereas the bottom liquid of column 75 mainly comprises diphenyl carbonate which is recycled through conduit 87 to the second stage polymerizer vessel 73 (column 25, lines 24-32). It is undisputed that the process of operative claim 1 differs from the process shown in Figure 1 of D5 only in that the phenol distillation residue, i.e. the residue of the phenol distillation of the ingredients vaporized during the polymerization reaction, is sent to the diphenyl carbonate distillation step used for the production of the diphenyl carbonate. Such a diphenyl carbonate distillation step is represented in Figure 1 of D5 by distillation column 53 (see also column 24, lines 15-34).

Problem solved

5. Having regard to the disclosure of D5, the appellant argued that the problem solved by the process of operative claim 1 is the provision of an alternative process, since the polycarbonate obtained in D5 are indicated to be colorless, while the respondent submitted that the process of operative claim 1 would lead to a polycarbonate which is less coloured than in D5.
 - 5.1 While the absence of colour of the polycarbonate which is mentioned in column 26, lines 45-47 of D5 was observed only after 700 hours of operation (column 26,

lines 38 to 41), it was not disputed by the appellant that an actual industrial production equipment is generally subjected to a continuous operation for about one year. The indication in paragraph [0021] of the patent in suit that the distillation residue resulting from the polycarbonate production step, i.e. the residue of the phenol distillation step, is generally coloured was also not disputed by the appellant. Accordingly, when the whole amount of the phenol distillation residue is sent like in D5 to the second stage polymerisation vessel, it is reasonable to assume that the coloured ingredients such as high-boiling ingredients by-produced during the polymerization, even in trace amounts, are not discharged from inside of the system and are accumulated therein. On that basis it is reasonable to assume that the products susceptible to cause coloration of the polycarbonate will accumulate in the process of D5 in reactor 73 making it more likely that the polycarbonate leaving the polymerization reactors through conduit 100 is after one year of production disadvantageous in terms of colour values.

- 5.2 In the process of operative claim 1 the residue of the phenol distillation is sent to the diphenyl carbonate distillation step. As illustrated in Figure 1 of D5, the residue at the bottom of the distillation column 53 used for purification of the diphenyl carbonate is removed via conduit 64 so that materials having a boiling point higher than diphenyl carbonate, including some coloured impurities will be removed by distillation in column 53. Accordingly, it is credible that in the method of operative claim 1 part of the products causing coloration of the polycarbonate, and which in D5 are accumulated in reactor 73, are disposed of with the distillation step used for the production

of the diphenyl carbonate, meaning that at least a part of the coloured impurities will not reenter the reaction loop with the recycled diphenyl carbonate, contrary to what is done in D5.

- 5.3 Accordingly, the problem successfully solved over D5 by the method of claim 1 can be formulated as to reside in the provision of a process with which the product can be maintained colorless over a longer period of time. The additional argument by the respondent that the claimed method did not lead to any deterioration of the produced polycarbonate in comparison to the method described in D5 was not retained for the formulation of the problem solved over D5, as the respondent bearing the burden of proof for the facts it alleged did not submit any evidence or any technical explanation in support of such allegation.

Obviousness of the solution

6. It remains to be decided whether the skilled person desiring to solve the problem identified above would, in view of the disclosure of D5, possibly in combination with other prior art documents or with common general knowledge, have modified the process for producing an aromatic polycarbonate of D5 in such a way as to arrive at the subject matter of operative claim 1.
- 6.1 Having regard to paragraph [0021] of the patent in suit, it appears that it was known to the skilled person that the source of coloration of the produced polycarbonate resided in the accumulation in the polymerisation reactor of products present in the phenol distillation residue. This is consistent with the patent proprietor/respondent's position analysing

the disclosure of D6 according to which substances causing coloration are described in D6 to be part of the high-boiling by-products contained in the compounds vaporizing during the polymerization reaction. Accordingly, the Board accepts to the advantage of the appellant and following also the position of the respondent that the skilled person was aware that the source of coloration of the produced polycarbonate resided in the accumulation in the polymerisation reactor of products present in the phenol distillation residue. In any case this assumption is in view of the conclusion below not to the detriment of the respondent (see point 6.8 below).

6.2 Furthermore, it was obvious for the skilled person already based on economic considerations that the phenol distillation residue containing mainly diphenyl carbonate should not be discarded and therefore recycled, which implies that the diphenyl carbonate should be purified, i.e. separated from at least part of the impurities causing coloration. The need to recycle chemicals used for the production of polycarbonate is not only shown in D5 for phenol (the low boiling fraction comprising phenol leaves the top of column 75 and is sent to distillation column 102, separated phenol being then sent through line 106 to tank 107 before being reused to produce diphenyl carbonate), but also for diphenyl carbonate, wherein as shown in above point 4 the bottom liquid of column 75 comprising mainly diphenyl carbonate is recycled to the second stage polymerizer vessel 73. The need to recycle chemicals used for the production of polycarbonate, i.e. diphenyl carbonate and phenol is also shown in D6 (Figure 1 shown below in point 7; paragraphs [0016], [0023] and [0026]) wherein recycled diphenyl carbonate

is reused for the process to produce polycarbonate by transesterification in the melt.

- 6.3 Hence, the issue of obviousness of the claimed method boils down to the question whether the skilled person would find any suggestion in the prior art to perform the step of purifying the phenol distillation residue containing mainly diphenyl carbonate, i.e. the bottom liquid of column 75 represented in Figure 1 of D5, in the distillation column used for the production of diphenyl carbonate, in order to separate the diphenyl carbonate from at least some impurities causing coloration.
- 6.4 The respondent's argument that D5 would teach away from that solution as this step would result in xylenol and cresol to return in part to polymerizer vessels 71 and 71', leading to a polycarbonate whose melt stability is worsened, cannot convince. The answer to the question as to what a person skilled in the art would have done in the light of the state of the art depends on the technical result he had set out to achieve (see T 0939/92, OJ EPO, 1996, 309, reasons Nrs 2.4.2 and 2.5.3). In the present case, the skilled person is merely seeking to provide a process with which the polycarbonate can be maintained colorless over a longer period of time, regardless of any result concerning melt stability of this polymer, in line with the fact that claim 1 has not been argued, let alone shown to specify any measure which would counter that side effect. In other words, merely accepting the inconvenient related to a deteriorated melt stability when adopting a solution aimed at improving a different property cannot justify itself the existence an inventive step.

6.5 Concerning the obviousness to separate the diphenyl carbonate from at least some impurities causing coloration in the distillation column used for the production of diphenyl carbonate, the appellant merely stated that *"if for whatever non-disclosed reason it is deemed necessary to purify the residue, which mainly consists of DPC, it is rather obvious to purify it in a DPC distillation step that is already present at the site"*. No other explanation was provided as to why this would be "rather obvious" and above all no reference was made to the prior art, let alone any evidence submitted in this respect. However, as required by Article 56, first sentence EPC, denying the existence of an inventive step presupposes the indication of hints at the proposed solution in the state of the art within the meaning of Article 54(2) EPC. In the present case, the appellant did not refer to any state of the art, and a fortiori to any suggestion contained therein which would have prompted the skilled person to go into the direction of the claimed method.

6.6 The mere fact mentioned by the appellant that the phenol distillation residue also contains diphenyl carbonate and phenol is not alone sufficient to suggest that the phenol distillation residue should be sent to the distillation step used for the production of diphenyl carbonate. At most it explains why the invention claimed can be carried out. In this context and as to the use of the term "obvious" by the appellant, a distinction has to be made between on the one hand the obviousness of the solution in the sense that it appears logical or evident as to why for the reader of the patent in suit, i.e. with the knowledge of the claimed invention, the solution claimed must solve the problem identified by applying the problem solution approach, and on the other hand obviousness of

the solution within the meaning of Article 56 EPC which requires that said solution is suggested or hinted at by the state of the art in accordance with Article 54(2) EPC, which per definition includes only what was made available before the date of filing of the European patent application and therefore excludes knowledge of the patent in suit.

6.7 Although as indicated above it appears logical with the knowledge of the patent in suit to use the same distillation column for purifying diphenyl carbonate synthesized on site and the residue of the phenol distillation, because both products comprise large proportions of diphenyl carbonate, no prior art document has been cited which would generally suggest a common use of a distillation column present on industrial site, let alone in the particular context of mixtures comprising large amounts of diphenyl carbonate.

6.8 Accordingly, in the absence of any further argument as to why the claimed solution would be suggested to the skilled person in view of the state of the art, the Board is bound to conclude that the subject-matter of claim 1 of the main request was not obvious to a person skilled in the art starting from the disclosure of D5, even in the assumption that the skilled person was aware that the source of coloration of the polycarbonate produced in D5 resided in the accumulation in the polymerisation reactor of impurities present in residue of the phenol distillation.

6.9 For these reasons, the Board concludes that the appellant's objection that the subject-matter of claim 1 does not involve an inventive step within the

meaning of Articles 52(1) and 56 EPC over D5 as the closest prior art fails to convince.

Process of D6 as the closest prior art

7. The method for producing an aromatic polycarbonate as disclosed in D6 (paragraphs [0017], [0019] and [0023]) is shown in the diagram on page 3 and in Figure 1 of that document, both reproduced below:

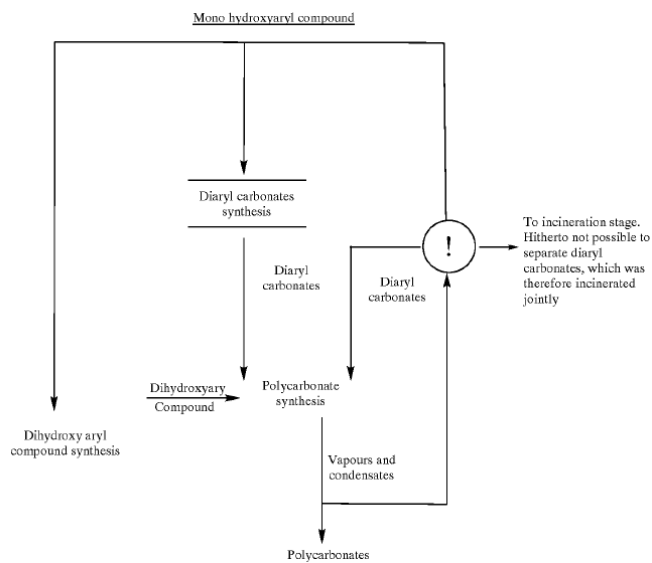
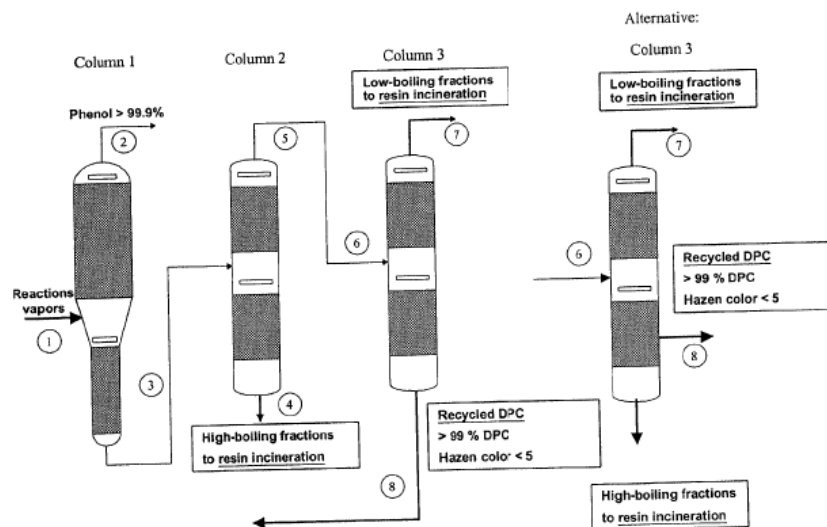


Fig. 1



8. It was not disputed that the process of operative claim 1 differs from the process of D6 solely in that the phenol distillation residue generated in the phenol distillation step is sent to the diphenyl carbonate distillation step instead of being separated from its high-boiling and low-boiling fractions as shown in Figure 1 of D6. The argument of the appellant that in D6 a liquefaction of the vaporized ingredients resulting from the polymerization step must take place before the phenol distillation step is carried out was not disputed by the respondent. The Board has no reason to take a different view.

Problem solved

9. The respondent submitted that the method of operative claim 1 allows in comparison to that of D6 a longer operation time, reference being made to the expression "After a recycle period of 1 week" used in the last sentence of paragraph [0083] of E6. The Board in its communication sent in preparation for oral proceedings doubted that it could be understood from that passage that such a process could be only operated for one week, this passage merely indicating that the colour and the concentration of the polycarbonate product had been tested in D6 after one week of operation without providing any indication on how long such process could be carried out while providing the same result. Moreover, contrary to the process carried out in D5 in which coloured impurities contained in the residue of the phenol distillation accumulate in the second stage polymerizer (point 5.1 above), those impurities are in D6 incinerated as shown in Figure 1 of that document. The Board also indicated in the same communication that there was no apparent reason why the feature distinguishing the claimed process from that of D6

would result in a longer operation time of the process and that according to the case law of the boards of appeal, alleged but unsupported advantages could not be taken into consideration in respect of the determination of the problem successfully solved by the invention. In other words there was no reason based on the features recited in claim 1 of the main request to assume that such alleged advantage over D6 would in fact be achieved.

10. This finding was not disputed in the respondent's reply of 19 August 2019. Under such circumstances and in line with the decision under appeal the problem successfully solved by the subject-matter of operative claim 1 over the process described in D6 merely resides in the provision of a further process for producing an aromatic polycarbonate.

Obviousness of the solution

11. As to whether for the skilled person faced with the above problem it would have been obvious in the light of the prior art or the common general knowledge to send the residue of the phenol distillation to the diphenyl carbonate distillation step used for the production of said compound, the same considerations as indicated in above points 6.2 to 6.7 apply. Whereas it would have been obvious for the skilled person in view of D6 and D5 to keep recycling the diphenyl carbonate in order to provide a further process for producing an aromatic polycarbonate, the appellant has not shown that the state of the art would have suggested to the skilled person that the same distillation step could be used for separating the products originating from the preparation of diphenyl carbonate and those contained in the residue of the phenol distillation.

11.1 Accordingly, the objection that the subject-matter of claim 1 does not involve an inventive step within the meaning of Articles 52(1) and 56 EPC over D6 as the closest prior art is also not convincing.

12. The Board thus finds that none of the objections on file prejudices the maintenance of the patent in the form of the main request.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar:

The Chairman:



B. ter Heijden

D. Semino

Decision electronically authenticated